

-1-

DELINTING OF COTTON SEED**BACKGROUND OF THE INVENTION**

THIS invention relates to a method and apparatus for delinting cotton seed.

After cotton boll has been picked, the cotton seed is removed from the cotton boll mechanically. After the mechanical removal, the seeds are still covered with cotton lint. Seeds covered with cotton lint are referred to as a "fuzzy seed".

In order to facilitate the planting of seed, the lint must be removed from the fuzzy seed to provide "black seed".

Currently, lint is removed from cotton seed using an acid such as H_2SO_4 or HCl . This is called the acid delinting of cotton seed. The problem with this method is that the acid is corrosive and not environmentally friendly.

It is an object of this invention to provide an alternative method for delinting of cotton seed.

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-2-

SUMMARY OF THE INVENTION

According to a first aspect of the invention there is provided a method of delinting cotton seed, the method including the step of mixing the cotton seed with abrasive particles.

The mixing preferably involves propelling and bringing the cotton seed and abrasive particles into high-speed contact with each other.

The cotton seed and abrasive particles may be brought into high-speed contact with each other by mechanical means such as a mixer, or preferably through the use of high-speed air.

Typically, the abrasive particles have a mean diameter of from 0.1 mm to 2 mm.

The abrasive particles could be calcium carbonate, glass, diatomaceous earth, sugar and/or sand, preferably sea sand or river sand.

According to a second aspect of the invention there is provided an apparatus for delinting cotton seed, the apparatus comprising a vessel including a cylindrical inside wall and means for introducing compressed air into the vessel tangentially relative to the inside wall.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a pictorial view of an apparatus for delinting cotton seed according to a preferred embodiment of the invention; and

Figure 2 is a cross-sectional view of the apparatus of Figure 1 along the line 2-2.

DESCRIPTION OF PREFERRED EMBODIMENTS

According to the invention, lint is removed from "fuzzy" cotton seed by mixing and propelling both the seed and abrasive particles in high-speed contact with each other in a contained space or vessel. Typically, the abrasive particles have a mean diameter of 0.1 mm to 2 mm. Any abrasive particles such as calcium carbonate, glass, diatomaceous earth, sugar or sand, may be used. Sea sand has been found to be particularly effective, as well as cost effective.

In a first embodiment of the invention, mechanical means in the form of a mixer is provided to propel the seed and abrasive material into high-speed contact, in a container space or closed vessel. Typically, the vessel is made from stainless steel. In laboratory tests using a mechanical mixer which was run at speeds from 50 rpm to 1000 rpm, preferably 200 rpm to 1000 rpm, it has been found that from 70% to over 90% of the lint is removed from the "fuzzy" cotton seed. The mixer preferably includes an extractor which extracts lint from the mixer and traps the lint in a filter. Lint removed from the filter can be used commercially. Alternatively, the mixer may be a speed mixer with intensifiers. The seed is in contact with the abrasive particles whilst they are both kept in a state of high-speed movement mechanically.

A second, preferred, method for propelling the fuzzy seed and abrasive particles in high-speed movement and contact with each other is the use of high-speed air as the propelling agent. This is achieved by placing the seed and the abrasive material in an enclosed or contained area and using air movement to move them in abrasive contact with each other, thus removing the lint from the seed. Referring to Figures 1 and 2, fuzzy seed and abrasive particles are placed in a vessel 10. The vessel 10 includes a cylindrical inside wall 12 having a circular profile, a base 14 and a top end 16. An annular flange 18 is provided at the top end 16 and defines a top opening 20. A pipe 22 which is connected to a source of compressed air (not shown) is provided for introducing compressed air into the vessel 10

-4-

via an aperture 24 in the inside wall 12 so that the compressed air is introduced tangentially relative to the inside wall 12. The compressed air is at a pressure of 0.5 to 2 bar ($0.5 \times 10^5 \text{Pa}$ to $2 \times 10^5 \text{Pa}$), typically 1 bar ($1 \times 10^5 \text{Pa}$) and is introduced into the vessel 10 via the pipe 22 so as to propel the abrasive particles and cotton seed in a high speed circular motion (indicated by the arrows in Figure 2) within the vessel. It has been found that from 70% to over 90% of the lint is removed from the "fuzzy" cotton seed. Exhaust air from the container is allowed to escape through the top opening 20 of the vessel 10. A filter bag may be placed over the top opening 20 to trap the lint which has been removed from the fuzzy cotton seed as it exits the vessel 10. The delinted seed and sand remain in the container and can be separated by means of a sieve. One of the advantages of using air as the propelling agent is that it has a gentle action on the seed, so that the seeds are not damaged.

An advantage of the invention is that once the delinted cotton seeds have been separated from the abrasive particles, the abrasive particles can be re-used. Thus, the process is cost-effective. The process is also environmentally friendly because it does not make use of large amounts of acid as is done in the prior art. A further advantage is that lint removed from the seed is retained, and can be used commercially.

Non-limiting Examples of the invention are provided below:

Example 1

Fuzzy cotton seed and sea sand are added in a food processor mixer at a ratio of 2 parts by volume seed to 1 part by volume sand. The mixer is started and is run at about 500 rpm with extraction to remove any lint, which comes off of the seed. This lint is recovered from a filter unit and can be used commercially. The mixer can run for a cycle of 10 to 15 minutes and about 90% of the lint is removed from the seeds. Thereafter, the mixture is put through a screen, which will separate the cotton seed from

-5-

the sand. The sand is then recovered and can be reused. It is optional to vary the mixing time and speed of mixing to improve lint removal.

Example 2

35 grams of sea sand and 5 grams of fuzzy cotton seed are placed in the cylindrical vessel shown in the drawings. This vessel has an inside diameter of 10 cm and a height of 4 cm. Compressed air at a pressure of 1bar ($1 \times 10^5 \text{Pa}$) is introduced tangentially near the bottom of the vessel so as to propel the sand and cotton seed in a high speed circular motion within the vessel and in contact with each other. The compressed air is introduced into the vessel through a pipe with an inner diameter of 3 mm. The fuzzy cotton seed and sand are propelled in the high speed circular motion for 10 to 15 minutes and more than 70% of the lint is removed from the seeds. The exhaust air is allowed to escape from the top of the container through a circular vent of 3 cm in diameter. Attached to this vent is a filter bag which allows the air to escape but traps the lint which has been removed from the fuzzy cotton seed. The delinted or black seed and sand remain in the container and can be separated from each other by means of a sieve. The remaining sand can be re-used.